AF/IFW

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of	PATENT
William SETTER et al.	Confirmation No. 4584
Serial No.: 10/767,190	Docket No. 119508-00102
Filed: January 30, 2004	Customer No. 27557
For: SYSTEM AND METHOD FOR CONTROLLING AN IMPACT TOOL	Art Unit: 3721
	Examiner: N. C. Chukwurah

AMENDED APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sirs:

In response to the August 18, 2006 Notification of Non-Compliant Appeal Brief, attached is an Amended Appeal Brief.

TABLE OF CONTENTS

For the appeal to the Board of Patent Appeals and Interferences from the decision dated December 1, 2005 of the Primary Examiner finally rejecting claims 1-26 and the May 23, 2006 Notice of Panel Decision maintaining the rejection of claims 1-26 in connection with the above-identified application, Applicants/Appellants submit the following brief in accordance with 37 C.F.R. § 1.192.

1. Real Party In Interest

Methode Electronics, Inc. is the assignee and real party in interest.

2. Related Appeals and Interferences

There are no other related appeals or interferences known to Appellants, Appellants' legal representative, or Assignee, which would directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

3. Status of Claims

Claims 1-26 are pending in this application. See Appendix 1-1 for a listing of the claims. In the final Office Action dated December 1, 2005, claims 1-3, 7-13 and 17-23 are rejected under 35 U.S.C. 102(b) as allegedly being anticipated by U.S. Patent No. 6,311,786 to Giardino et al., and claims 4-6, 14-16 and 24-26 are rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Giardino et al.

Claims 1-26 are the subject of this Appeal.

4. Status of Amendments

No amendment was filed subsequent to the final rejection of December 1, 2005.

5. Summary of Claimed Subject Matter

The invention relates to a method for dynamically calculating the torque being applied to a fastener by an impact tool using the characteristics of individual pulses over a period of time. The method provides better control of the impact tool and prevents under and over tightening of the fastener.

As seen in Fig. 3, an impact tool 30 includes a body 302, a shaft 304 connected thereto and a torque transducer 306 surrounding the shaft 304. The shaft 304 is adapted to be coupled to a fastener 40, such as by using an anvil attached to the end of the shaft. The torque transducer 306 produces a magnetic field proximate the shaft 304 in relation to the amount of torque being applied to the shaft 304. A controller 310 includes circuits adapted to perform the functions of digitizing and parsing the pulse signals.

After applying a torque pulse to the fastener, the method provides for detecting the signal representing the time-amplitude waveform of the torque pulse, as seen in Fig. 2. Fig. 2 illustrates the time-amplitude waveform of a single pulse produced by the impact tool. As seen in Fig. 2, the stress represented by a single pulse is proportional to the torque on the fastener at the time of impact and is also proportional to the static torque on the fastener after tightening is completed. For example, when the impact tool 30 applies a tightening torque to the fastener 40, the signal response would be similar to that shown in Fig. 2, with the primary pulse, determined by the

output from the torque transducer 306, being above 2.5 VDC (i.e., zero volts, normalized), and the secondary pulse being less than 2.5 VDC. See col. 9, lines 12-21 of Appellants' disclosure.

Next, the controller 310 executes a series of routines to fit a number of different equations to find the best one that approximates the torque pulse waveform. See page 10, lines 17-20 and Figs. 4, and 5a-5d. After processing the selected equation to determine the torque being applied to the fastener, that torque value is compared to a pre-determined torque objective. Finally, a second torque pulse is applied to the fastener if the torque objective was not met.

Independent claim 1 recites a method for determining the torque applied to a fastener comprising the steps of:

applying a torque pulse to a fastener (see page 10, line 14 of Applicants' specification);

detecting a signal representing the time-amplitude waveform of the torque pulse (see page 10, lines 15-16 of Applicants' specification; Fig. 2);

fitting an equation that approximates the time-amplitude waveform by selecting one mathematical expression from a set of mathematical expressions and selecting at least one parameter that describes the torque pulse from a set of parameters (see page 10, lines 17-19 of Applicants' disclosure);

processing the equation to determine the torque being applied to the fastener (see page 10, lines 19-20 of Applicants' disclosure);

comparing the torque to a pre-set torque objective (see page 10, lines 20-22 of Applicants' disclosure); and

applying a second torque pulse to the fastener if the torque is less than the pre-set torque objective (see page 10, lines 22-25 of Applicants' disclosure).

Independent claim 11 recites a method for determining the torque applied to a fastener comprising the steps of:

applying a plurality of torque pulses to a fastener during a fastener tightening sequence, wherein the torque pulses have a duration and amplitude (see page 6, lines 14-16, and page 10, lines 14 of Applicants' specification);

detecting a signal representing the time-amplitude waveform shapes of each of the torque pulses (see page 10, lines 15-16 of Applicants' disclosure);

converting the signals into mathematical expressions representing each of the torque pulses, wherein each mathematical expressions is selected from a set of mathematical expressions and include parameters representing at least the amplitude and duration of the torque pulses (see page 6, lines 19-20, and page 10, lines 17-19 of Applicants' disclosure);

processing the mathematical expressions to obtain the torque applied to the fastener during the torque pulses (see page 10, lines 19-20 of Applicants' disclosure); and

terminating the fastener tightening sequence if the torque is approximately equal to a pre-set torque objective (see page 6, line 21 and page 10, lines 22-25 of Applicants' disclosure).

Independent claim 21 recites an apparatus for producing a plurality of torque pulses during a tightening sequence of a fastener comprising:

an impact tool (see Fig. 3, reference numeral "30");

a shaft operatively connected to the impact tool (see Fig. 3, reference numeral "304");

a torque transducer coupled to the shaft (see Fig. 3, reference numeral "306");

a sensor proximate the torque transducer (see page 8, line 6 of Applicants' disclosure); and

a controller (see Fig. 3, reference numeral "310"),

wherein the controller enables the impact tool, applies one or more pulses to the shaft, receives waveform signals from the sensor, monitors and conditions the signals (see page 9, lines 22-25, and page 10 lines 1-10 of Applicants' disclosure); selects an equation that approximates the signals by selecting a mathematical expression from a set of mathematical expressions and selecting at least one parameter that describes the torque pulse from a set of parameters (see page 10, lines 17-19 of Applicants' disclosure); processes the equation to obtain the torque on the fastener (see page 10, lines 19-20 of Applicants' disclosure); and disables the impact tool, and wherein the equation represents the time-amplitude curve of the one or more pulses and includes parameters for the amplitude, duration and the area under the time-amplitude curve (see page 10, lines 15-16 of Applicants' disclosure).

6. Grounds of Rejection To Be Reviewed On Appeal

Whether claims 1-3, 7-13 and 17-23 are anticipated by U.S. Patent No. 6,311,786 to Giardino et al. under 35 U.S.C. 102(b); and whether claims 4-6, 14-16 and 24-26 are unpatentable over Giardino et al. under 35 U.S.C. 103(a).

7. Argument

A. Summary of Argument

Neither a prima facie case of anticipation nor obviousness has not been established with respect to claims 1-26 because all of the claim limitations of independent claims 1, 11 and 21 are not identically found in U.S. Patent No. 6,311,786 to Giardino et al. (hereinafter "Giardino et

al."). More specifically, Giardino et al. fails to disclose, teach or suggest a method for determining the torque applied to a fastener including the step of fitting or selecting an equation that approximates a signal representing the torque pulse applied to the fastener by selecting a mathematical expression from a set of mathematical expressions, as recited in the claimed invention.

B. Summary of Rejection

Claims 1-3, 7-13 and 17-23 are rejected under 35 U.S.C. 102(b) as allegedly being anticipated by Giardino et al., and claims 4-6, 14-16 and 24-26 are rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Giardino et al. Giardino et al. is interpreted as disclosing applying a torque pulse to a fastener; detecting a signal representing the time-amplitude waveform of the pulse; fitting an equation that approximates the time amplitude waveform, processing the equation; comparing the torque to a pre-set torque objective; and applying a second torque. The Examiner suggests that although Giardino et al. does not expressly teach selecting one mathematical expression from a set of mathematical expressions that approximates the time-amplitude waveform, as recited in the claimed invention, the method of Giardino et al. is nonetheless "capable of having different preprogrammed sets of mathematical torque expressions."

C. Applicable Law

Anticipation requires that every limitation of a claim must identically appear in a prior art reference. See *Gechter v. Davidson*, 43 U.S.P.Q. 2d 1030, 1032 (Fed. Cir. 1997). Absence from the prior art reference of any claimed element negates anticipation. See *Rowe v. Dror*, 42

U.S.P.Q.2d 1550, 1553 (Fed. Cir. 1997). Also, "to establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.'" *In re Robertson*, 169 F.3d 743, 745, 49 U.S.P.Q.2d 1949, 1950-51 (Fed. Cir. 1999).

D. Error to Reject Claims 1-3, 7-13 and 17-23 Under 35 U.S.C. 102(b)

Appellants submit that a prima facie case of anticipation has not been established because the step of fitting an equation that approximates the time-amplitude waveform of the torque pulse by selecting a mathematical expression from a set of mathematical expressions, as recited in independent claims 1, 11 and 21, is not identically found in Giardino et al. The claimed invention not only requires multiple expressions, but also requires the ability to select one expression from the multiple expressions. In contrast, Giardino et al. teaches using a single predetermined equation (col. 4, line 11) when determining torque, and not one selected from a group of equations.

As described in Appellants' specification at page 10, lines 17-20 and page 11, line 19 – page 14, line 13, the equation used in the claimed invention is selected from a number of possible equations or mathematical expressions using a curve fitting function to determine the most appropriate expression. That is, the impact tool controller must first fit the data to a number of different equations to find the best one that approximates the specific pulse waveform detected for the threaded joint before the controller can determine the torque. The equation fitting process is done in real time, i.e., until the pulse waveform data are collected and the

equation fitting process is complete, the actual equation to be used for calculating torque is unknown. This approach takes a number of different fastening process parameters into account (page 11, line 21 – page 12, line 4) to arrive at a more complete conclusion about the pulse waveform. This takes into account that there are variations between fasteners and their tightness after assembly.

In contrast, Giardino et al. teaches using a single pre-determined equation (col. 4, line 11) for calculating torque. More specifically, the equation used is the impact pulse I defined as the integral of the pulse waveform, as described in col. 3, lines 60-63 and col. 4, lines 7-19. Thus, torque is always determined by the formula T-(Ir)/dt (col. 4, line 40) and impulse I is always calculated as $I = \int Fdt$ (col. 4, line 11). In other words, the equation taught by Giardino et al. for the impulse I is not selected from set of mathematical expressions, as recited in the claimed invention, because the same equation for determining impulse I is always used, and thus there is no set of mathematical expressions. Thus, Giardino et al. assumes that all of the information required to accurately determine torque is contained within an single equation, that is the integral of the pulse waveform, and does not account for variations in fastener tightness, distortion in the torque to magnetic field or magnetic field to electrical signal. Therefore, Giardino et al. teaches neither multiple mathematical expressions nor the ability to select one expression from the multiple mathematical expression.

The Examiner's suggestion that Giardino et al. is "*capable* of having more preprogrammed sets of mathematical torque expressions" does not meet the test for anticipation, which is identity. Moreover, if by "capable" the Examiner means "inherent," neither evidence nor rational is provided to support that assertion. "To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described

in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.'" *In re Robertson*, 169 F.3d 743, 745, 49 U.S.P.Q.2d 1949, 1950-51 (Fed. Cir. 1999). The Examiner has provided no evidence that the step of selecting a mathematical expression from a set of mathematical expressions is necessarily present in Giardino et al.

Anticipation requires that every limitation of a claim must identically appear in a prior art reference. See *Gechter v. Davidson*, 43 U.S.P.Q. 2d 1030, 1032 (Fed. Cir. 1997). It is clear that the limitation of a fitting an equation by selecting a mathematical expression from a set of mathematical expressions does not identically appear in Giardino et al. Absence from the prior art reference of any claimed element <u>negates</u> anticipation. See *Rowe v. Dror*, 42 U.S.P.Q.2d 1550, 1553 (Fed. Cir. 1997).

Therefore, in view of the above, Appellants request reconsideration and withdrawal of the rejection under 35 U.S.C. 102(b), and allowance of independent claims 1, 11 and 21.

Dependent claims 2-10, 12-20 and 22-26 are also believed allowable for the same reasons as discussed above. Moreover, these claims recite additional features not found in Giardino et al. For example, claims 2 and 12 recite that the equation/mathematical expression includes a parameter selected from a list of parameters. The passage in Giardino et al. (col. 4, lines 20-25) cited in the Office Action merely references t_f and discloses buffering data so that data points immediately before and after the impulse I are captured, and does not relate to the parameters recited in the claims.

E. <u>Error to Reject Claims 4-6, 14-16 and 24-26 Under 35 U.S.C. 103(a)</u>

Appellants submit that a prima facie case of obviousness has not been established with respect to claims 4-6, 14-16 and 24-26 because Giardino et al fails to disclose, teach, suggest or render obvious all of the limitations of independent claims 1, 11 and 21. As discussed above, Giardino et al. fails to disclose, teach or suggest the step of fitting an equation that approximates the time-amplitude waveform of the torque pulse by selecting a mathematical expression from a set of mathematical expressions. Moreover, nothing in Giardino et al. suggests that it would have been obvious to select the an equation from a set of mathematical expressions. Instead, Giardino et al. teaches that only one equation is needed, as discussed above.

Accordingly, Appellants submit that dependent claims 4-6, 14-16 and 24-26 are allowable for the same reasons as discussed above with respect to claims 1, 11 and 21. Moreover, these claims recite additional features not found in Giardino et al. For example, claims 4, 5, 14, 15, and 25 recite specific equations not found in Giardino et al. Moreover, the final Office Action provided no motivation to modify Giardino et al. to use the equations of claims 4, 5, 14, 15, and 25 as required to establish a prima facie case of obviousness.

8. <u>Conclusion</u>

For all the reasons stated above, the Applicants-Appellants request that the Board reverse the Examiner's rejections as noted above and instruct the Examiner to confirm the patentability of the rejected claims and issue a notice of allowability.

The $500 fee for filing a brief in support of an appeal was submitted on May 1, 2006. The Commissioner is hereby authorized to charge any additional fees due or any overpayment of fees to Deposit Account No. 23-2185 (119508-00102).

Respectfully submitted,

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Date: August 24, 2006

CLAIMS APPENDIX

LISTING OF CLAIMS:

1. **(previously presented)** A method for determining the torque applied to a fastener comprising the steps of:

applying a torque pulse to a fastener;

detecting a signal representing the time-amplitude waveform of the torque pulse;

fitting an equation that approximates the time-amplitude waveform by selecting one mathematical expression from a set of mathematical expressions and selecting at least one parameter that describes the torque pulse from a set of parameters;

processing the equation to determine the torque being applied to the fastener;

comparing the torque to a pre-set torque objective; and

applying a second torque pulse to the fastener if the torque is less than the pre-set torque objective.

2. (original) The method of claim 1, wherein the equation includes at least one parameter selected from the group consisting of the positive amplitude; negative amplitude; absolute value of the positive amplitude minus the negative amplitude; integrated area of the positive portion of the pulse curve; integrated area of the negative portion of the pulse curve; duration of the positive portion; duration of the negative portion; area from the positive amplitude to 50% of the positive amplitude; area from the negative amplitude to 50% of the negative amplitude; duration of the positive portion measured at 50% of the positive amplitude; duration of the negative portion measured at 50% of the negative amplitude; time between the start of the positive pulse and the actual pulse peak amplitude; time between the start of the

negative pulse and the actual pulse peak amplitude; and time between the peaks of the first and second torque pulses.

3. (original) The method of claim 1, wherein the equation for the torque pulse is linear.

4. (original) The method of claim 3, wherein the linear equation is represented by the formula:

$$\text{torque} = f(t) = \beta_0\, \varphi_0(t) + \beta_1\, \varphi_1(t) + \beta_2\, \varphi_2(t) + \beta_3\, \varphi_3(t),$$

wherein t is a time scale, and wherein $\beta_0 \ldots \beta_3$, are correlation coefficients and are determined using the method of least squares after collecting data from sample runs, and wherein $\varphi_0(t)$ represents the highest positive peak amplitude of the torque pulse, $\varphi_1(t)$ represents the negative peak amplitude of the torque pulse, $\varphi_2(t)$ represents the positive area of the torque pulse and $\varphi_3(t)$ represents the positive width of the torque pulse.

5. (original) The method of claim 4, wherein the correlation coefficients are determined by minimizing the function, S:

n

$$S = \sum_{i=1} [\, y_i - \beta_0\, \varphi_0(x_i) - \beta_1\, \varphi_1(x_i) - \beta_2\, \varphi_2(x) - \beta_3\, \varphi_3(x_i)]^2$$

6. (original) The method of claim 1, wherein the equation for the torque pulse is non-linear.

7. **(previously presented)** The method of claim 1, wherein the step of fitting an equation representing the torque pulse includes selecting at least two parameters that describe the torque pulse from the set of parameters.

8. (original) The method of claim 1, wherein the signal is produced by a magnetoelastic torque transducer associated with a shaft and an induction coils proximate the shaft.

9. (original) The method of claim 1, wherein an impact tool is used to apply the torque pulse to the fastener.

10. (original) The method of claim 1, wherein the impact tool is a pneumatic-driven torque wrench.

11. **(previously presented)** A method for determining the torque applied to a fastener comprising the steps of:

applying a plurality of torque pulses to a fastener during a fastener tightening sequence, wherein the torque pulses have a duration and amplitude;

detecting a signal representing the time-amplitude waveform shapes of each of the torque pulses;

converting the signals into mathematical expressions representing each of the torque pulses, wherein each mathematical expressions and include parameters representing at least the amplitude and duration of the torque pulses;

processing the mathematical expressions to obtain the torque applied to the fastener during the torque pulses; and

terminating the fastener tightening sequence if the torque is approximately equal to a pre-set torque objective.

12. (original) The method of claim 11, wherein the mathematical expressions also include at least one additional parameter selected from the group consisting of the maximum positive amplitude; maximum negative amplitude; absolute value of the positive amplitude minus the negative amplitude, integrated area of the positive portion of the pulse curve; integrated area of the negative portion of the pulse curve; duration of the positive portion; duration of the negative portion; area from the positive amplitude to 50% of the positive amplitude; area from the negative amplitude to 50% of the negative amplitude; duration of the positive portion measured at 50% of the positive amplitude; duration of the negative portion

measured at 50% of the negative amplitude; time between the start of the positive pulse and the actual pulse peak amplitude; time between the start of the negative pulse and the actual pulse peak amplitude; and time between successive positive peak amplitudes.

13. (original) The method of claim 11, wherein the mathematical expressions for the torque pulses are linear expressions.

14. (original) The method of claim 13, wherein the linear mathematical expressions are represented by the formula:

$$\text{torque} = f(t) = \beta_0\, \varphi_0(t) + \beta_1\, \varphi_1(t) + \beta_2\, \varphi_2(t) + \beta_3\, \varphi_3(t),$$

wherein t is a time scale, and wherein $\beta_0 \ldots \beta_3$, are correlation coefficients and are determined using the method of least squares after collecting data from sample runs, and wherein $\varphi_0(t)$ represents the highest positive peak amplitude of the torque pulses, $\varphi_1(t)$ represents the negative peak amplitude of the torque pulses, $\varphi_2(t)$ represents the positive area of the torque pulses and $\varphi_3(t)$ represents the positive width of the torque pulses.

15. (original) The method of claim 14, wherein the correlation coefficients are determined by minimizing the function, S:

$$S = \sum_{i=1}^{n} [\, y_i - \beta_0\, \varphi_0(x_i) - \beta_1\, \varphi_1(x_i) - \beta_2\, \varphi_2(x) - \beta_3\, \varphi_3(x_i)]^2$$

16. (original) The method of claim 11, wherein the mathematical expressions for the torque pulses are non-linear.

17. (original) The method of claim 11, wherein the step of converting the signals into mathematical expressions representing the torque pulses is accomplished by selecting one mathematical expression from a set of mathematical expressions and selecting at least two parameters that describe the torque pulses from a set of parameters.

18. (original) The method of claim 11, wherein the signal is produced by a magnetoelastic torque transducer associated with a shaft and an induction coils proximate the shaft.

19. (original) The method of claim 11, wherein an impact tool is used to apply the plurality of torque pulses to the fastener.

20. (original) The method of claim 11, wherein the impact tool is a pneumatic-driven torque wrench.

21. **(previously presented)** An apparatus for producing a plurality of torque pulses during a tightening sequence of a fastener comprising:

an impact tool;

a shaft operatively connected to the impact tool;

a torque transducer coupled to the shaft;

a sensor proximate the torque transducer; and

a controller,

wherein the controller enables the impact tool, applies one or more pulses to the shaft, receives waveform signals from the sensor, monitors and conditions the signals; selects an equation that approximates the signals by selecting a mathematical expression from a set of mathematical expressions and selecting at least one parameter that describes the torque pulse from a set of parameters; processes the equation to obtain the torque on the fastener; and disables the impact tool, and wherein the equation represents the time-amplitude curve of the one or more pulses and includes parameters for the amplitude, duration and the area under the time-amplitude curve.

22. (original) The apparatus of claim 21, wherein the impact tool is a pneumatic torque wrench.

23. (original) The apparatus of claim 21, wherein the equation is linear.

24. (original) The apparatus of claim 23, wherein the linear equation is represented by the formula:

$$\text{torque} = f(t) = \beta_0\, \varphi_0(t) + \beta_1\, \varphi_1(t) + \beta_2\, \varphi_2(t) + \beta_3\, \varphi_3(t),$$

wherein t is a time scale, and wherein $\beta_0 \ldots\ \beta_3$, are correlation coefficients and are determined using the method of least squares after collecting data from sample runs, and wherein $\varphi_0(t)$ represents the highest positive peak amplitude of the torque pulse, $\varphi_1(t)$ represents the negative peak amplitude of the torque pulse, $\varphi_2(t)$ represents the positive area of the torque pulse and $\varphi_3(t)$ represents the positive width of the torque pulse.

25. (original) The apparatus of claim 24, wherein the correlation coefficients are determined by minimizing the function, S:

$$S = \sum_{i=1}^{n} [\, y_i - \beta_0\, \varphi_0(x_i) - \beta_1\, \varphi_1(x_i) - \beta_2\, \varphi_2(x) - \beta_3\, \varphi_3(x_i)]^2$$

26. (original) The apparatus of claim 21, wherein the equation is non-linear.

EVIDENCE APPENDIX

COPIES OF DECEMBER 1, 2005 OFFICE ACTION FINALLY REJECTING PENDING CLAIMS AND MAY 23, 2006 NOTICE OF PANEL DECISION

UNITED STATES PATENT AND TRADEMARK OFFICE

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OIPE IAP48 AUG 24 2006 PATENT & TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/767,190	01/30/2004	William Setter	119508-00102	4584

27557 7590 12/01/2005

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CHUKWURAH, NATHANIEL C	
ART UNIT	**PAPER NUMBER**
3721	

DATE MAILED: 12/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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Action Due	Due Date
Amendment After Final	3/1/06
Notice of Appeal Last Day	6/1/06

Office Action Summary	Application No. 10/767,190	Applicant(s) SETTER ET AL.	
	Examiner Nathaniel C. Chukwurah	Art Unit 3721	

OIPE IAP48 AUG 24 2006 PATENT & TRADEMARK OFFICE

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 September 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26* is/are pending in the application.

4a) Of the above claim(s) ____ is/are withdrawn from consideration.

5)☐ Claim(s) ____ is/are allowed.

6)☒ Claim(s) *1-26* is/are rejected.

7)☐ Claim(s) ____ is/are objected to.

8)☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 January 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. ____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date ____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. ____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: ____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 7-13 and 17-23 are rejected under 35 U.S.C. 102(b) as being anticipated by Giardino et al. (US 63,11,786).

With regard to claim 1, Giardino et al. discloses a method comprising the step of: applying a toque pulse to a fastener (col. 3, lines 10-13), detecting a signal representing the time-amplitude waveform of the toque pulse (col. 3, lines 60-63), fitting an equation that approximates the time amplitude waveform (col. 4, lines 7-15), processing the equation to determine the torque being applied to the fastener (col. 4, lines 16-49), comparing the torque to a pre-set torque objective (col. 5, lines 29-38) and applying a second torque pulse to the fastener if torque is less than pre-set torque objective.

Giardino et al. do not expressly state that the method includes fitting an equation that approximates the time-amplitude waveform by selecting one mathematical expression from a set of mathematical expressions and selecting at least one parameter that describes the torque pulse from a set of parameters. Giardino et al.'s method for determining the torque applied to a fastener is capable of having more preprogrammed set of mathematical torque expressions and selecting at least one parameter that describes the torque pulse from a set of parameters which describes the torque pulse from a set of parameters.

With regard to claim 2, Giardino et al. shows an equation that includes positive amplitude; wherein as I is defined as product of force and time (see col. 4, lines 7-14), when an impact is detected, tf is set to be impact plus some number of clock counts which is equivalent as in claimed.

With regard to claim 3, Giardino et al. shows a linear equation T=d(Ir)/dt, which detects impulse which measures torque at different point in time over a period of time and provide the desired torque.

With regard to claim 7, Giardino et al. show the step of selecting the torque pulse from two parameters (impact number and time duration) that describes torque pulses from a set of parameters (col. 4, lines 29-62).

With regard to claim 8, Giardino et al. shows a signal producing magneto-elastic torque transducer (37 magneto-elastic ring) coupled to the shaft (18) and induction coil (32 coupling) proximate shaft (front end of the shaft).

With regard to claim 9, Giardino et al. shows an impact tool (10).

With regard to claim 10, Giardino et al. shows a wrench (10).

With regard to claim 11, Giardino et al. discloses a method comprising the steps of: applying a plurality of toque pulse to a fastener (col. 3, lines 10-13), detecting a signal representing the time-amplitude waveform of the toque pulse (col. 3, lines 60-63), converting the signals into mathematical expression (col. 4, lines 10-28), fitting an equation that approximates the time amplitude waveform (col. 4, lines 7-15), processing the equation to determine the torque being applied to the fastener (col. 4, lines 16-49), and the data gathered and/or calculated is displayed and /or written to data storage, as desired as in step 20 and turning off the green light

(col. 6, lines 17-18 and 20), which is equivalent of terminating the fastener tightening sequence as claimed. Giardino et al. do not expressly state that the method includes fitting an equation that approximates the time-amplitude waveform by selecting one mathematical expression from a set of mathematical expressions and selecting at least one parameter that describes the torque pulse from a set of parameters. Giardino et al.'s method is capable of having more preprogrammed set of mathematical torque expressions so as to select mathematical torque expressions for each torque pulse.

With regard to 12, Giardino et al. shows an equation that includes positive amplitude; wherein as I is defined as product of force and time (see col. 4, lines 7-14), when an impact is detected, tf is set to be impact plus some number of clock counts which is equivalent as in claimed

With regard to claim 13, Giardino et al. shows a linear equation T=d(Ir)/dt, which detects impulse which measures torque at different point in time over a period of time and provide the desired torque.

With regard to claim 17, Giardino et al. shows the steps of converting the signal into an equation representing the torque pulses from two parameters (impact number and time duration) that described torque pulses from a set of parameters (col. 4, lines 29-62).

With regard to claim 18, Giardino et al. shows a signal producing magneto-elastic torque transducer (37 magneto-elastic ring) and induction coil (32 coupling) proximate shaft (front end of the shaft).

With regard to claim 19, Giardino et al. shows a torque impact tool (10).

With regard to claim 20, Giardino et al. shows a wrench (10).

With regard to claim 21, Giardino et al. discloses an apparatus comprising an impact tool (10), a shaft (18) operatively connected to the impact tool, a torque transducer (37) coupled to the tool, a sensor (30) proximate the impact tool, a controller (50) enabling the impact tool to apply one or more pulses to the shaft (18), and which is capable of receiving waveform signals from sensor (30), monitors and conditions the signals, selects an equation that represents the signals, processes the equation to obtain torque on the fastener and disables the impact tool.

With regard to claim 22, Giardino et al. shows a pneumatic torque wrench (10).

With regard to claim 23, Giardino et al. shows linear equation; $I=\int Fdt$; $T=d(Ir)/dt$.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 4-6, 14-16 and 24-26 rejected under 35 U.S.C. 103(a) as being unpatentable over Giardino et al.

With regard to claims 4, 5, 14, 15, 24 and 25, Giardino et al. disclose all claimed subject matter but lack the specific teaching of an equation showing a correlation coefficient; however, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the data processing unit (50) of Giardino et al. with the capability of determining correlation coefficient through an equation since the apparatus of Giardino et al. anticipates the claimed structure and method for determining torque applied to a fastener.

With regard to claim 6, 16 and 26, Giardino et al. disclose all claimed subject matter but lack the specific teaching of a non-linear equation for torque pulses, however, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the data processing unit (50) of Giardino et al. with the capability of representing the torque pulses with non-linear equation since the apparatus of Giardino et al. anticipates the claimed structure and method for determining torque applied to a fastener.

Response to Arguments

Applicant's arguments filed 9/13/2005 have been fully considered but they are not persuasive.

With respect to claim 1, 11 and 21 applicant argues that Giardino et al. fail to disclose, teach or suggest the step of fitting an equation that approximates the time-amplitude waveform by selecting one mathematical expression from a set of mathematical expressions and selecting at least one parameter that describes the torque pulse from a set of parameters.

It is the Examiner's position that, as shown in the rejection above, Giardino et al.'s method for determining the torque applied to a fastener is capable of having different preprogrammed sets of mathematical torque expressions and selecting at least one parameter that describes the torque pulse from a set of parameters which describes the torque pulse from a set of parameters.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nathaniel C. Chukwurah whose telephone number is (571) 272-4457. The examiner can normally be reached on M-F 6:00AM-2:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rinaldi Rada can be reached on (571) 272-4467. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

NC

November 10, 2005.

Rinaldi I. Rada
Supervisory Patent Examiner
Group 3700

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MAY 24 2006

EXAMINER	
CHUKWURAH, NATHANIEL C	
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Please find below and/or attached an Office communication concerning this application or proceeding.

DOCKETED
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Action Due	Due Date
Appeal Brief	7/1/06

PTO-90C (Rev. 10/03)

Application Number	Application/Control No.	Applicant(s)/Patent under Reexamination	
	10/767,190	SETTER ET AL.	
	Chukwura, N	Art Unit 3721	

Document Code - AP.PRE.DEC	

Notice of Panel Decision from Pre-Appeal Brief Review

This is in response to the Pre-Appeal Brief Request for Review filed 5/1/06.

1. ☐ **Improper Request** – The Request is improper and a conference will not be held for the following reason(s):

   ☐ The Notice of Appeal has not been filed concurrent with the Pre-Appeal Brief Request.
   ☐ The request does not include reasons why a review is appropriate.
   ☐ A proposed amendment is included with the Pre-Appeal Brief request.
   ☐ Other: .

The time period for filing a response continues to run from the receipt date of the Notice of Appeal or from the mail date of the last Office communication, if no Notice of Appeal has been received.

2. ☒ **Proceed to Board of Patent Appeals and Interferences** – A Pre-Appeal Brief conference has been held. The application remains under appeal because there is at least one actual issue for appeal. Applicant is required to submit an appeal brief in accordance with 37 CFR 41.37. The time period for filing an appeal brief will be reset to be one month from mailing this decision, or the balance of the two-month time period running from the receipt of the notice of appeal, whichever is greater. Further, the time period for filing of the appeal brief is extendible under 37 CFR 1.136 based upon the mail date of this decision or the receipt date of the notice of appeal, as applicable.

   ☒ The panel has determined the status of the claim(s) is as follows:
   Claim(s) allowed: ______.
   Claim(s) objected to: ______.
   Claim(s) rejected: 1-26.
   Claim(s) withdrawn from consideration: ______.

3. ☐ **Allowable application** – A conference has been held. The rejection is withdrawn and a Notice of Allowance will be mailed. Prosecution on the merits remains closed. No further action is required by applicant at this time.

4. ☐ **Reopen Prosecution** – A conference has been held. The rejection is withdrawn and a new Office action will be mailed. No further action is required by applicant at this time.

All participants:

(1) Gregory M. Vidovich

(2) Sipos, J.

(3) Chukwura, N.

(4)_____.

RELATED PROCEEDINGS APPENDIX

NONE